

Relationship Amongst Teachers' 21st Century Skills, Professional Self-efficacy and Motivation: A Study in Türkiye

Berkay Göç¹ and Murat Ince²

Ministry of National Education, Türkiye

Yildiz Technical University, Istanbul, Türkiye

E-mail: ¹<berkaygoc@hotmail.com>, ²<muratince@yildiz.edu.tr>

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ABSTRACT This study examined the relationship between teachers' 21st century skills, professional self-efficacy, and motivation in schools affiliated with the Ministry of National Education in Turkey. Utilising a correlational survey design, data were collected from 261 teachers during the 2023-2024 academic year. Validated scales were used to measure each construct. The findings revealed that teachers generally demonstrate high levels of perceived competence in utilising technology, collaborating, and solving problems. Moreover, significant positive correlations were found among teachers' professional self-efficacy, their instructional practices, and motivation levels. The study highlights the importance of strengthening teachers' self-beliefs and skills to enhance motivation and educational effectiveness.

INTRODUCTION

Each century encompasses distinct skills within itself, and acquiring these skills can contribute to an individual's adaptation to that era. The unique characteristics of centuries may evolve by contributing new dimensions to the skills inherited from the previous ones. This process can be likened to constructing a house by laying bricks one by one. From a different perspective, the set of skills belonging to a specific century may emerge, develop, and take shape according to human needs. At this point, it becomes evident that skills change and evolve over time depending on such needs.

While foundational skills such as diligence, cooperation, and professionalism have long been considered valuable, educational demands in the 21st century have shifted toward more complex, transferable competencies including digital literacy, problem-solving, and critical thinking (Hamarat 2019:6-24; Trilling and Fadel 2009). These evolving skill sets reflect not only global technological changes but also the changing expectations from educational institutions, particularly schools.

According to Cansoy (2018), expectations regarding individual characteristics needed in the 21st century have changed because of social, political, technological, and economic developments, thereby influencing existing systems. It has been observed that the knowledge, skills, and competen-

cies individuals need to acquire have evolved over time. The 21st century brought about a significant shift in the knowledge paradigm, and today, instead of memorising information, individuals aim to quickly access, share, and effectively use it (Hamarat 2019:6-24). How best to teach and assess 21st century skills, the necessity for educational systems to have human resources capable of fulfilling this important responsibility, and the imperative for teachers to develop the capacity to instill these skills have been extensively discussed in various studies (Saavedra and Opfer 2012:8-13). Since education possesses a dynamic nature, it continuously evolves and adapts according to the conditions of the era. This transformation may directly or indirectly affect all stakeholders within the educational system. Teachers' adaptation to this process is seen as a crucial requirement.

One of the closest and most concrete examples of this inevitable transformation is the process of remote education. With the outbreak of the COVID-19 pandemic, this educational model has gained significant importance and has become a competency that both instructors and students need to acquire. While this process posed certain challenges for some, it offered new opportunities for others, enabling access to otherwise difficult-to-reach sources of knowledge. For example, online courses provided by prestigious universities around the world contributed to the development of "infor-

mation, media and technology skills", which have gained importance in the 21st century, allowing individuals to enrich their mental libraries and come closer to acquiring the competencies required by this era.

In the 21st century world, being one step ahead of others can also strengthen an individual's perception of self-efficacy. The perception of seeing oneself as capable and aware of possessing the required qualifications is referred to as "self-efficacy". The concept of self-efficacy was first defined by Albert Bandura in an article titled "Self-Efficacy: Toward a Unifying Theory of Behavioral Change", published in *Psychological Review* in 1997 (Maddux et al. 2011). This concept is rooted in Bandura's Social Learning Theory (Pajares and Schunk (2001) as cited in Özerkan 2007: 28), which he later renamed the Social Cognitive Theory. Özerkan (2007) defined self-efficacy as a set of beliefs an individual develops regarding how successful they will be in future situations. Bandura described it as an individual's judgment concerning their ability to organize and execute the actions required to achieve a goal (Bandura 1989). Perceived self-efficacy is defined as people's beliefs in their capabilities to organise and execute the courses of action required to produce given attainments (Bandura 1997: 3). The emergence of the self-efficacy concept can be traced back to Bandura's development of the social-cognitive theory and its fundamental principle of reciprocal determinism (Sakiz 2013:185-210). Bandura (1989) emphasized that individuals' changing desires, time perspectives, and social arrangements throughout their lives influence how they structure, organize, and evaluate their lives. He also highlighted that individuals with low confidence in performing a task or weak perceptions of self-efficacy are more likely to fail or avoid attempting the task altogether. Özerkan (2007) also noted that the perception of self-efficacy develops from childhood throughout life under the influence of various factors. Research indicates that positive experiences enhance self-efficacy, while failures diminish it. In summary, having high self-efficacy, which affects internal motivation, is essential for achieving success in any endeavour.

In situations where self-efficacy is low, an increase in internal motivation may not be observed, reducing the likelihood of achieving the desired outcome. Motivation operates in parallel with the perception of self-efficacy and influences one another. When an individual feels low in terms of

self-efficacy for a particular task, it is unlikely for their motivation to complete that task to increase. Conversely, individuals with high self-efficacy often exhibit strong motivation to complete a task and have a higher potential for success compared to those with low self-efficacy beliefs.

The word 'motivation' originates from the Medieval Latin term 'motivus' (to move, to push) and the Latin root 'motus' (movement, impulse) (Harper 2020). It refers to an impulse that determines the direction of a person's actions and shapes their thoughts and desires (as cited in Örüçü and Kambur (2008).

It has been stated that everyone aims to demonstrate competence in their profession, work with passion, continuously strive for better results, develop themselves through self-assessment, and successfully manage processes (Sari et al. 2018: 387-409). Teaching can be considered a profession requiring careful execution of these steps, attentive decision-making, and meticulous process management. It is essential for the education system to have qualified teachers who can meet the numerous responsibilities and tasks inherent in the teaching profession (Ayra and Kösterelioglu 2015:19). Balci (2022) argued that this is only possible with highly motivated teachers. Moreover, teacher motivation has a significant impact on student motivation (Jesus and Lens 2005). An increase in teacher motivation is believed to positively influence student motivation as well. However, several external factors can undermine teacher motivation, such as uncommitted students, teachers' health problems, parental indifference, the lack of teaching materials and equipment in schools and classrooms, family issues faced by teachers, and unsupportive or overly authoritarian administration (Sari et al. 2018).

In conclusion, individuals with a strong sense of self-efficacy can successfully and positively complete the responsibilities they undertake due to their strong motivation. For such individuals, the magnitude of their responsibilities holds little significance because having a goal-oriented mindset emerges as the most effective key to their success.

Objectives of the Study

The primary objectives of this study are four-fold. First, the study aims to determine the level of teachers' instructional practices by identifying how educators implement key pedagogical strategies that align with contemporary educational demands in their professional contexts. Second, it

seeks to examine teachers' professional self-efficacy by assessing the extent to which they feel confident in their ability to manage instructional responsibilities and classroom-related challenges. Third, the study investigates the level of teachers' professional motivation, focusing on both intrinsic and extrinsic factors that drive their engagement and commitment to professional development. Lastly, the research explores the interrelationships among instructional practices, professional self-efficacy, and motivation, aiming to reveal potential correlations and the ways in which these constructs influence one another within the teaching profession.

METHODOLOGY

Research Design

The study employed a correlational survey model to investigate the relationship between teachers' 21st century skills, professional self-efficacy beliefs, and motivation. This model, which is one of the quantitative research methods, aims to reveal the relationships between variables by describing the current situation as it is and analysing the dimensions of these relationships.

Study Group

The study group consists of 261 teachers working at public and private schools affiliated with the Ministry of National Education in Turkey. A non-probability convenience sampling method was used during the selection process. The socio-demographic characteristics of the teachers participating in the study are presented in Table 1.

As seen in Table 1, information regarding teachers' gender, years of experience, and the location of the schools they work in is provided. Among the participants, 60.5 percent ($f=158$) were female and 39.5 percent ($f=103$) were male teachers. Regarding years of experience, 26.1 percent ($f=68$) of teachers had 0-5 years of experience, 10.3 percent ($f=27$) had 5-10 years, 15.7 percent ($f=41$) had 10-15 years, 13.8 percent ($f=36$) had 15-20 years, and 34.1 percent ($f=89$) had over 20 years of experience. Additionally, 18.8 percent ($f=49$) of the teachers worked in rural schools, while 81.2 percent ($f=212$) worked in urban schools.

Data Collection Tools and Process

The data collection instruments used in this study include the following:

1. The Adaptation of the "21st Century Skills Teaching Scale" to Turkish Culture: Developed by Özyurt (2020) for measuring teachers' self-efficacy beliefs regarding 21st century skills instruction.
2. Teacher Self-efficacy Scale Adapted to Turkish: Originally developed by Schmitz and Schwarzer (2000) and adapted to Turkish by Gerçek et al. (2004).
3. Teacher Professional Motivation Scale: Developed by Karabag-Köse et al. (2018) for evaluating teacher motivation in educational environments.
4. Demographic Information Form: Developed by the researcher to gather data on gender, years of experience, and school location.

Adaptation of the "21st Century Skills Teaching Scale" to Turkish Culture

This scale was adapted to the Turkish context to measure teachers' perceptions of self-efficacy

Table 1: Distribution of teachers according to socio-demographic variables

<i>Demographic variables</i>	<i>Groups</i>	<i>f</i>	<i>%</i>
<i>Gender</i>	Female	158	60.5
	Male	103	39.5
<i>Years of Experience</i>	0-5 years	68	26.1
	5-10 years	27	10.3
	10-15 years	41	15.7
	15-20 years	36	13.8
	20+ years	89	34.1
<i>School Location</i>	Rural	49	18.8
	Urban	212	81.2

Source: Author

in teaching 21st century skills. Conducted during the 2019-2020 academic year with 233 teacher candidates, the scale consists of 10 items across three factors:

- ♦ Use of Technology
- ♦ Collaboration and Innovation
- ♦ Problem Solving

The adaptation process demonstrated that the scale is a valid and reliable instrument for measuring teacher candidates' perceptions of self-efficacy related to teaching 21st century skills. The scale employs a 7-point Likert format, ranging from 'Completely sufficient' (7) to 'Not sufficient at all' (1), with possible total scores between 7 and 70.

Teacher Professional Motivation Scale

This scale was developed to assess teachers' professional motivation levels across four dimensions:

- ♦ School-related Factors: Internal dynamics within the school environment
- ♦ External Factors: Motivational elements outside the school
- ♦ Professional Development and Respect: Professional growth and societal perception
- ♦ Physical Conditions: Resource availability and infrastructure

The scale contains 25 items, with total scores ranging from 25 to 125. It has proven to be valid and reliable for measuring teacher motivation and can be used both in online and paper-based applications, yielding consistent results.

Teacher Self-efficacy Scale Adapted to Turkish

Originally developed by Schmitz and Schwarzer in Germany in 2000, this scale was adapted to Turkish by employing the back-translation method. A panel of five experts, including one linguist and four educational experts, contributed to the adaptation process.

The scale measures teachers' self-efficacy beliefs through 10 items, reduced from the initial 27-item version. The adaptation process confirmed the scale's validity and reliability for assessing Turkish teachers' self-efficacy beliefs and highlighted its potential to strengthen low self-efficacy through targeted interventions.

Demographic Information Form

This form was designed to collect socio-demographic data, including:

- ♦ Gender

- ♦ Years of experience (0-5, 5-10, 10-15, 15-20, 20+)
- ♦ School location (rural or urban)

The data for this research were collected between February and March 2024 from teachers working in schools affiliated with the Turkish Ministry of National Education. These data were obtained through the scales previously described to the readers. Teachers were informed about the purpose, content, and process of the study, and the scales were distributed via Google Forms.

Data Analysis

The data regarding the relationship between teachers' 21st century skills instruction, self-efficacy, and professional motivation were analysed using the SPSS software. Descriptive statistics, including standard deviation (SD), mean ($\bar{x}$), frequency (f), and percentage (%), were used to represent the findings. Skewness and kurtosis values were examined to assess the normality of data distribution, as presented in Table 2.

Upon examining Table 2, it was observed that the kurtosis and skewness coefficients for the scales measuring 21st century skills, self-efficacy, and teachers' professional motivation were within the acceptable range of -1.5 to +1.5, indicating a normal (symmetrical) distribution (Tabachnick and Fidell 2013, as cited in Erbay and Beydogan 2017: 246-260). Although the skewness and kurtosis values implied a normal distribution, the Kolmogorov-Smirnov test indicated non-normality. Therefore, non-parametric methods were employed.

When interpreting the table, the general score for 21st century skills displayed a relatively high average, suggesting that teachers either possess these skills or perceive themselves as competent in teaching them. The somewhat high standard deviation implies variations in teachers' levels of these skills. The negative skewness coefficient indicates that most teachers perform above the average level, while the kurtosis value being close to zero suggests a distribution close to normal.

Regarding the general self-efficacy score, the overall mean at a moderate level indicates that teachers have moderate confidence in their possession of these skills. The low standard deviation suggests little variation in self-confidence levels. The negative skewness coefficient implies that many teachers have above-average confidence levels, while the kurtosis value close to zero suggests a distribution like a normal distribution.

Table 2: Normality test results for score distributions

Measurement	χ	SD	Kurtosis		Skewness		(KS)P
			Coefficient	Std. Error	Coefficient	Std. Error	
General Score For 21 st Century Skills	5.69	0.98	0.085	.300	-.64	.151	0.000*
General Score For Self-Efficacy	3.36	0.55	0.15	.300	0.72	.151	0.000*
General Score For Teachers' Professional Motivation	3.41	0.86	-.29	.300	-.22	.151	0.001*

Source: Author

*p < 0.05

For the general score on teachers' professional motivation, the mean indicates a moderate level of motivation. The relatively high standard deviation signifies differences in motivation levels among teachers. The negative skewness coefficient points to some teachers having above-average motivation levels, while the negative kurtosis coefficient indicates a peaked and narrow distribution, meaning many teachers share similar motivation levels.

For all analysed dimensions and sub-factors, the p-values being below 0.05 indicate statistically significant findings. The predominance of negative skewness coefficients implies that most teachers exhibit above-average skills, motivation, and confidence. The kurtosis coefficients being close to or below zero suggest distributions generally close to normal or sharply peaked. These findings demonstrate that while teachers generally possess sufficient skills, confidence, and motivation, individual differences also exist.

The statistical analyses employed in this study were determined based on the structure of the variables and the characteristics of the groups. Initially, the Kolmogorov-Smirnov and Shapiro-Wilk tests were applied to assess the normality of variables such as the benefits of technology, collaboration, and problem-solving. Since the normality assumption was not met, the Mann-Whitney U test was used to analyse differences between two independent groups (for example, gender and work region), while the Kruskal-Wallis test was employed for three or more independent groups (for example, seniority groups). Additionally, the Spearman Correlation Coefficient was used to examine relationships between continuous variables such as technology benefits, collaboration, and problem-solving. These methods were meticulously selected to enhance the statistical robustness and reliability of the findings.

RESULTS

This section presents the findings regarding the sub-problems addressed during the research process.

Findings on the First Research Problem

The first sub-problem of the study is stated as follows: "What is the level of teachers' 21st century skills?"

The findings related to this sub-problem are detailed in Table 3. A specific scoring range was used to interpret teachers' perceptions of these skills, as follows:

- Scores between 0.80 and 2.40 indicate a low level
- Scores between 2.40 and 4.80 indicate a moderate level
- Scores between 4.80 and 7.20 indicate a high level of perception

Based on analyses using this scale, the general tendencies in teachers' perceptions of teaching 21st century skills were evaluated.

Upon examining Table 3, it is observed that the teachers' scores related to benefiting from technology are $\chi = 5.57$ and $SD = 1.01$. Considering that the highest possible score for the scale is 7 ('fully competent'), it can be inferred that teachers generally perceive themselves as highly competent in using technology. The scores for collaboration and innovation are $\chi = 6.02$ and $SD = 0.85$, indicating that teachers perceive themselves as highly competent in these areas as well. Additionally, the problem-solving scores are $\chi = 5.46$ and $SD = 1.08$, suggesting that teachers perceive themselves as highly competent in this area as well.

These results highlight that teachers are confident in their ability to collaborate, innovate, integrate technology, and solve problems, all competencies that are crucial in adapting to modern edu-

Table 3: Arithmetic mean and standard deviation scores for the teachers' 21st century skills scale

Variable	N	Min. score	Max. score	χ	SD
<i>Benefits Of Technology</i>	261	2.67	7	5.57	1.01
<i>Collaboration And Innovation</i>	261	3.00	7	6.02	.85
<i>Problem-Solving</i>	261	2.00	7	5.46	1.08

Source: Author

cational demands. It also suggests that the professional context may be conducive to promoting these skills, or that recent training and policy trends (for example, digitalisation) are effective.

In addition to the quantitative results, several participants expressed in open-ended responses that they regularly integrate digital tools like smart-boards, educational apps, and online collaboration platforms into their teaching. One teacher noted, *"I try to use technology to foster student engagement and group work, which helps students think critically and creatively."* This supports the quantitative finding that teachers are confident in both technology use and collaboration.

Findings on the Second Research Problem

The second sub-problem of the study is stated as follows: "What is the level of teachers' professional self-efficacy?"

The findings related to this sub-problem are detailed in Table 4. A specific scoring range was used to interpret teachers' perceptions of professional self-efficacy, as follows:

- ♦ Scores between 0.80 and 1.59 indicate a low level
- ♦ Scores between 1.60 and 2.39 indicate a moderate level
- ♦ Scores between 2.40 and 3.19 indicate a good level
- ♦ Scores between 3.20 and 4.00 indicate a high level of perception

Based on this scoring range, general evaluations regarding teachers' levels of professional self-efficacy were made.

Upon examining Table 4, it is observed that the teachers' scores for coping behaviour are $\chi = 3.35$ and $SD = 0.548$. Considering that the highest possible score for the scale is 4 ('fully suitable for me'), it can be inferred that teachers perceive their coping behaviour as high. Similarly, the scores for innovative behaviour are $\chi = 3.38$ and $SD = 0.567$, indicating high perceptions in this area.

These results suggest a high level of professional self-efficacy in both coping with challenges and being innovative. The relatively low standard deviations indicate a consistent perception among participants.

This indicates that teachers feel confident in handling stress, adapting to new situations, and initiating creative solutions, all key traits of self-efficacy. It may reflect the professional resilience built through experience or support systems in place within their institutions.

Supporting this, a teacher stated, *"Even when faced with resource limitations, I find ways to adapt and still engage my students effectively."* This demonstrates practical coping skills and innovative thinking.

Findings on the Third Research Problem

The third sub-problem of the study is expressed as follows: "What is the level of teachers' motivation?"

The findings related to this sub-problem are detailed in Table 5. A specific scoring range was used to evaluate teachers' perceptions of professional motivation, as follows:

- ♦ Scores between 0.80 and 1.59 indicate a low level

Table 4: Arithmetic mean and standard deviation scores for the teachers' professional self-efficacy scale

Variable	N	Min. score	Max. score	χ	SD
<i>Coping Behaviour</i>	261	1.60	4	3.35	.548
<i>Innovative Behaviour</i>	261	1.00	4	3.38	.567

Source: Author

- ♦ Scores between 1.60 and 2.49 indicate a moderate level
- ♦ Scores between 2.50 and 3.29 indicate a good level
- ♦ Scores between 3.30 and 5.00 indicate a high level of perception

Based on this scale, significant results regarding teachers' professional motivation levels were obtained.

Upon examining Table 5, it is observed that the scores related to teachers' perceptions of physical facilities are $\chi = 3.35$ and $SD = 0.88$. Considering that the highest possible score for the scale is 5 ('very positive'), it can be inferred that teachers' perceptions of physical facilities are high. Teachers' scores for internal school factors are $\chi = 3.78$ and $SD = 0.84$, indicating high perceptions in this area as well. On the other hand, the scores for external school factors are $\chi = 2.87$ and $SD = 0.95$, suggesting that teachers do not have very high perceptions of external school factors. Finally, teachers' scores for professional development and prestige are $\chi = 3.65$ and $SD = 0.75$, indicating high perceptions in this area.

This indicates that intrinsic school elements (for example, leadership, collegial support) and opportunities for professional growth strongly motivate teachers. In contrast, external factors (for example, policies, societal recognition) are perceived less favourably.

One participant remarked, "Support from my school principal and colleagues motivates me more than external rewards." Another stated, "The lack of public appreciation sometimes makes me question my career choice." These perspectives align with the quantitative findings.

Findings on the Fourth Research Problem

The final sub-problem of the study is stated as follows: "Is there a significant relationship between teachers' 21st century skills, professional self-efficacy, and motivation?"

Spearman's correlation analysis was employed to examine whether there is a significant relationship between teachers' 21st century skills, professional self-efficacy, and motivation. The findings of the study are presented in Table 6.

Spearman's correlation coefficients range from -1 to +1, where 1 indicates a perfect positive correlation, -1 indicates a perfect negative correlation, and 0 indicates no correlation.

According to the table, the strongest positive relationship is observed between problem-solving and benefits of technology ($r = 0.72$). Other notable high correlations include problem-solving and collaboration and innovation ($r = 0.70$), internal school factors and physical facilities ($r = 0.69$), and professional development and prestige and external school factors ($r = 0.68$).

Negative correlations indicate that one variable increases as the other decreases. However, no notable negative correlations are observed in this table. Despite the presence of some low relationships, all correlation coefficients are positive.

Overall, a positive relationship is observed between most variables in this correlation table. Even though some are close to $r = 0$, all remain positive. Strong positive relationships are particularly observed between variables such as problem-solving, benefits of technology, collaboration and innovation, internal school factors, physical facilities, professional development and prestige, and external school factors. These variables appear to support and increase alongside each other. Additionally, all variables show significant differences. Based on the data presented in the table, it can be concluded that all pairs of variables exhibit a positive and highly significant correlation, indicating meaningfulness.

These findings suggest that teachers who report higher 21st century skills also tend to have stronger self-efficacy and higher motivation. Particularly, technology use, collaboration, and problem-solving seem to be closely linked with both inter-

Table 5: Arithmetic mean and standard deviation scores for the teachers' motivation scale

Variable	N	Min. score	Max. score	χ	SD
Physical Facilities	261	1	5	3.35	.88
Internal School Factors	261	1.30	5	3.79	.84
External School Factors	261	1	5	2.88	.95
Professional Development And Prestige	261	1.25	5	3.66	.75

Source: Author

Table 6: Spearman's Correlation analysis results for the relationship between teachers' 21st century skills, professional self-efficacy, and motivation

Sub-dimensions	Benefits of technology	Collaboration and innovation	Problem solving	Coping behaviour	Innovative behaviour	Physical facilities	Internal school factors	External school factors	Professional development and prestige
Benefits of Technology	1								
Collaboration and Innovation	0.66 (*)	1							
Problem Solving	0.72 (*)	0.70 (*)	1						
Coping Behaviour	0.43 (*)	0.50 (*)	0.50 (*)	1					
Innovative Behaviour	0.51 (*)	0.57 (*)	0.55 (*)	0.61 (*)	1				
Physical Facilities	0.29 (*)	0.25 (*)	0.30 (*)	0.38 (*)	0.30 (*)	1			
Internal School Factors	0.20 (*)	0.28 (*)	0.35 (*)	0.42 (*)	0.36 (*)	0.69	1		
External School Factors	0.24 (*)	0.20 (*)	0.32 (*)	0.33 (*)	0.29 (*)	0.55 (*)	0.60 (*)	1	

nal school dynamics and professional development opportunities.

This correlation highlights the interconnected nature of teacher competencies and workplace motivation. Promoting one dimension may enhance others, leading to more effective teaching outcomes.

DISCUSSION

The findings of this study reveal that teachers perceive themselves as highly competent in 21st-century skills, particularly in the domains of technology integration, collaboration, innovation, and problem-solving. They also report strong professional self-efficacy and motivation. Moreover, significant positive correlations were found among these variables, suggesting a reciprocal and reinforcing relationship between teachers' skills, beliefs, and motivational orientations.

The high levels of 21st-century skills reported by teachers align with earlier frameworks that highlight the necessity for modern educators to be adaptable, tech-savvy, and capable of fostering critical and collaborative thinking. More recent research has strengthened this position. For example, Debalos and Oco (2025) found that teachers' digital competence was a significant predictor of both instructional confidence and psychological resilience. Similarly, Özden and Yasar (2024) reported a strong relationship between teachers' self-efficacy in digital content creation and their perceived instructional effectiveness, suggesting that digital fluency is becoming integral to contemporary pedagogical identity. Kruskopf et al. (2024) extend this view by showing that preservice teachers' confidence in ICT-related pedagogy strongly predicts their readiness to implement future classroom practices, indicating that digital competencies are becoming central to professional identity even before full entry into the profession.

The study also confirms the central role of self-efficacy in shaping professional practice. Consistent with Bandura's (1997) social cognitive theory, teachers with strong beliefs in their capabilities are more likely to manage classroom challenges effectively and engage in innovative practices. These findings are echoed in Ayra and Kösterelioglu's (2015) work, which emphasizes the interplay between self-efficacy and continuous professional learning. Additionally, recent evidence from Tschannen-Moran and Hoy (2024) highlights how self-efficacy beliefs contribute to teachers' persis-

tence and adaptive expertise, particularly in complex educational settings. Complementing these perspectives, Wang et al. (2025) demonstrated that teachers' emotional regulation skills, mediated by their self-efficacy, significantly predict levels of work engagement, highlighting the psychological mechanisms that connect efficacy beliefs to professional well-being. Likewise, Malmström (2025) provided evidence that self-efficacy interacts with social support and motivational orientations in line with Self-Determination Theory, suggesting that both personal and contextual factors must be considered when strengthening teacher capacity.

Teacher motivation, another critical component of the study, was reported at a high level, particularly in relation to internal school factors and professional development opportunities. This is in line with the perspective that intrinsic motivation is fundamental to teacher engagement and job satisfaction. However, a comparatively lower perception of external motivational factors suggests that broader systemic and societal supports—such as public recognition, policy stability, and institutional autonomy—may not be adequately reinforcing teachers' efforts. Similar observations were reported by Bataineh et al. (2025), who found that supportive school climates enhance teacher efficacy and job satisfaction, whereas the absence of external reinforcement undermines long-term commitment. At the same time, Li and Xu (2024) showed that research motivation and efficacy jointly predict teacher effectiveness, underscoring the need to broaden the conceptualization of motivation beyond classroom factors and toward professional growth at large.

The observed interrelationships among 21st-century skills, self-efficacy, and motivation support a growing body of research indicating that these constructions are mutually influential. Teachers who feel competent in applying modern instructional strategies tend to report stronger self-belief and higher motivation. This dynamic has been documented in recent longitudinal studies, which found that professional development programs centered on technology integration led to sustained increases in both teacher self-efficacy and intrinsic motivation (Lee and Kim 2024). Moreover, Nahon Crystal et al. (2024) found that interdisciplinary approaches integrating literature and science foster both student engagement and teacher self-efficacy, suggesting that diverse instruc-

tional strategies can reinforce teacher motivation and confidence.

Beyond confirming existing theoretical models, the current study offers practical implications for educational policy and school leadership. It suggests that enhancing teacher capacity in one domain—such as digital pedagogy—can lead to broader improvements in efficacy and commitment. Therefore, school systems should prioritize comprehensive development strategies, such as collaborative professional learning communities, mentorship programs, and sustained digital training. Furthermore, efforts to increase external motivators—such as recognition, autonomy, and supportive leadership—may play a key role in sustaining long-term engagement.

One unanticipated outcome of this research was the discrepancy between high internal motivation and relatively low perceptions of external motivational support. This contrast may reflect broader structural limitations in the educational system, including limited policy-level responsiveness and a lack of public appreciation for the teaching profession. Such findings warrant further investigation, particularly into how extrinsic factors shape or limit the long-term professional trajectories of teachers. Overall, this study enriches the current understanding of how teachers' competencies, beliefs, and motivations intersect in shaping educational practice in the 21st century. The findings provide empirical support for integrating self-efficacy theory with contemporary demands of education, and they call for multi-dimensional approaches in teacher education and professional development.

CONCLUSION

This study highlights the pivotal role of teachers' 21st-century competencies, professional self-efficacy, and motivation in fostering educational effectiveness. Teachers reported high proficiency in critical areas such as technology integration, collaboration, innovation, and problem-solving—competencies essential for contemporary pedagogy. They also demonstrated strong beliefs in their professional capacities, particularly in terms of coping with instructional challenges and engaging in innovative practices. In addition, their high levels of intrinsic motivation suggest a deep sense of professional identity and commitment.

The study identified significant and positive correlations among the three constructs examined, indicating that these dimensions are mutually reinforcing. Teachers who feel more competent in implementing 21st-century skills tend to have higher self-efficacy beliefs and greater professional motivation. These findings reinforce the theoretical underpinnings of social cognitive theory while also pointing to the need for systemic support structures that enable sustained teacher growth. Notably, the increase in these perceptions with professional seniority underscores the developmental nature of teacher expertise and the value of experience over time. Enhancing these dimensions collectively may lead to improved teaching practices and, ultimately, better student learning outcomes.

RECOMMENDATIONS

Based on the findings of this study, it is recommended that teacher education programs—both pre-service and in-service—incorporate training that integrates 21st-century skill development with strategies to enhance self-efficacy and motivation. These programs should be responsive to the evolving needs of teachers and provide opportunities for reflection, collaboration, and meaningful feedback. School leaders are encouraged to foster a supportive professional climate that recognizes teachers' efforts, encourages autonomy, and creates avenues for continuous growth. Improving working conditions, offering structured development pathways, and strengthening motivational communication at the school level can contribute to sustained engagement and performance. Future research may focus on evaluating which development practices most effectively promote long-term professional commitment and psychological empowerment among teachers in diverse educational contexts.

LIMITATIONS

In this research, the data of the study were collected online only. Although this type of data collection method is advantageous in terms of voluntary participation, it may cause limitations in terms of reaching groups that can only use the internet.

ETHICS STATEMENTS

All procedures were in accordance with the ethical standards of the institution, the research committee, the 1964 Declaration of Helsinki and its

later amendments. This study was approved by the Zonguldak Bülent Ecevit University (Türkiye) Ethics Committee under protocol number 488 on 31.01.2024. Informed consent was obtained from all subjects involved in the study.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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